

METHOD AND APPARATUS TO INCREASE STRAIN EFFECT IN A TRANSISTOR CHANNEL

Abstract

A semiconductor device having a transistor channel with an enhanced stress is provided. To achieve the enhanced stress transistor channel, a nitride film is preferentially formed on the device substrate with little to no nitride on a portion of the gate stack. The nitride film may be preferentially deposited only on the silicon substrate in a non-conformal layer, where little to no nitride is deposited on the upper portions of the gate stack. The nitride film may also be uniformly deposited on the silicon substrate and gate stack in a conformal layer, with the nitride film proximate the upper regions of the gate stack preferentially removed in a later step. In some embodiments, nitride near the top of the gate stack is removed by removing the upper portion of the gate stack. In any of the methods, stress in the transistor channel is enhanced by minimizing nitride deposited on the gate stack, while having nitride deposited on the substrate.